

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements relating to Milling Cutters

5 We, RICHARD LLOYD LIMITED, a British Company, of Galton House, Elmfield Avenue, Tyburn, Birmingham, 24, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to milling cutters of the kind comprising a circular body the peripheral portion of which is formed with transverse slots receiving insertable and removable cutting units mounted and fixed within the slots, as by means of wedges or the like, screws or other releasable fastening means.

15 The principal object of the present invention is to provide an improved cutting unit provided with a throw-away or expendible cutter blade or tip and having simple means for fixing said blade or tip in the unit. Another object is to provide the unit with self-contained means for securing it within a slot in the cutter body.

20 According to the invention, a removable cutting unit, for a milling cutter of the kind referred to, comprises a holder, adapted to be inserted and fixed within a slot in the body of the milling cutter, and carrying a readily-removable throw-away or expendible cutter tip or blade, the forward end of said holder being of bifurcated form with two jaws, and the throw-away or expendible cutter tip or blade being clamped against one of the jaws by means of a wedge which is engaged between said tip or blade and the other jaw and which serves, simultaneously with the clamping of the tip or blade, to expand the jaws outwardly against the walls of the slot in the cutter body.

40 Means may be provided whereby the rear or inner end of the holder is adapted to be

fixed within the slot in the body independently of the fixing by expansion of the said front jaws, so that the position of the holder in its slot need not be disturbed when the front portion of the holder is released from the slot for insertion or removal of the tip.

Figure 1 of the accompanying drawings is a side elevation of a portion of a milling cutter provided with removable cutter units in accordance with the present invention.

Figure 2 is a fragmentary plan view of the top portion of the cutter showing one of the cutter units mounted in a slot.

Figure 3 is a cross-section on line III—III, Figure 2.

Figure 4 is a cross-section on line IV—IV, Figure 2.

Figure 5 is a longitudinal section on line V—V, Figure 2.

Figure 6 is a longitudinal section on line VI—VI, Figure 2.

Figure 7 is a perspective view of the cutter unit.

Referring to the said drawings, a milling cutter consists of a circular body 1, adapted for rotation, and having around its periphery a series of transverse slots 2, spaced apart equally in a circumferential direction, and being adapted to receive inserted cutting units; said body being generally or substantially of the conventional inserted-blade type.

Each cutting unit consists of a holder 3 carrying at one end a renewable and indexable cutter tip 4 which may be of a tungsten carbide or ceramic material and which is conveniently of square shape with cutting edges on all sides, so that it can be removed and replaced in a different position to bring another cutting edge into use, as required. The holder consists of a metal block of rectangular cross-section, but at a short distance from one side a longitudinal slot 5 is formed

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in it from the top face, and extending from the front of the holder to a point near the rear end. This slot is closed at the bottom and is somewhat narrower than the thickness of the cutter bit. It has a depth which progressively decreases from the front to the rear end where it terminates at the top surface of the holder, and thus the bottom face of the slot slopes upwardly from the underside of the holder, at the front end thereof, to the top face of the holder, near the rear end thereof, as shown in Figure 5. The front end of the holder is cut out or recessed at one side of the slot, at 6, to provide two laterally-spaced jaws 7, 8. The jaw 7 forms the outer side wall of the slot above referred to, and the bottom or floor 9 of the forward portion of the slot, adjacent the recess, forms a sloping ledge for supporting the throw-away cutter bit 4. (see Figure 5). The other jaw 8 is formed by the lateral wall of the recess above referred to, and has an inclined inner face engaged by a side face of a wedge 10 located within the recess 6 and adapted to be moved inwardly further into the recess by means of an inclined headed screw 11 passing, with clearance, through a plain hole in the wedge, from front to back, and engaging a tapped hole in the inner end of the recess.

The throw-away tip 4 is placed in the holder by resting it on the sloping ledge 9 at the forward end of the slot 5 (the wedge 10 being retracted) and moving it inwards along said ledge until arrested by the rear wall (which is inclined) of the wedge-receiving recess 6 adjacent the side which opens into slot 5, namely, at corner 12. The wedge is then moved further into the recess by means of the headed screw 11, and as its sloping side face is moved over the sloping face of the adjacent jaw 8, the opposite face moves towards and against the face of the cutter tip 4 so as to clamp the latter against the face of the adjacent jaw 7. At the same time the action of the wedge expands the jaws 7, 8, outwards against the walls of the slot 2 in the body 1.

The necessary cutting angles are provided by the seating surfaces in the holder.

The top edge of the forward portion of the outer jaw 7 of the slot is inclined so that the top face of this sloping portion of the wall is just below the top of the tip 4, ensuring that the said tip is supported against the jaw, on its one face, for substantially its full depth. The forward portion of the body of the holder, on the other side of the tip, also slopes downwardly towards the front but at a lower level than the sloping top of the outer jaw 7, and the wedge 10 has an inclined top face flush with said inclined body face, so that the wedge engages the cutter tip 4 below the upper edge of the latter.

The underside of the rear portion of the

holder is recessed or hollowed cut at 12 to provide laterally-spaced side walls or jaws 13 (see Figure 4) depending from the rear upper part of the holder, said rear portion being of inverted-U section. The inside faces of the side walls 13 are inclined so as to diverge downwardly, and engaging between the jaws is a vertically-movable wedge 14 having inclined side faces mating with those of said side walls. This wedge can be raised by means of a vertical headed screw 15 passing downwards through a plain hole in the top of the holder body into a tapped hole in the wedge.

The holder is adapted to be inserted into a parallel-sided slot 2 in the milling-cutter body 1, and can be fixed therein by operating the above-mentioned vertically-movable wedge 14, by means of the screw 15, so as to raise the wedge and thereby cause it to spread outwards the depending walls or jaws 13 of the holder into frictional engagement with the side surfaces of the slot. This ensures that the position of the holder in its slot 2 is not disturbed when the front wedge 10 is retracted for the removal or replacement of cutter tip 4.

In a modification, the wedge device at the back of the holder could be dispensed with and the rear portion of the holder fixed in the slot of the milling-cutter body by means of a wedge applied between a side of the holder and an opposed side of the slot, in the conventional manner.

With either of the above arrangements, the throw-away cutter tip can be released and replaced without disturbing the position of the holder in the cutter body, as although the slot-fixing is released at the front when the tip is freed, the holder will remain in position in its slot by reason of the fixing at the back remaining effective.

In a further modification the holder could have a transverse trapezoidal contour for insertion into suitably formed slots in the milling cutter body.

WHAT WE CLAIM IS:—

1. A removable cutting unit, for a milling cutter of the kind referred to, comprising a holder, adapted to be inserted and fixed within a slot in the body of the milling cutter, and carrying a readily-removable throw-away or expendible cutter tip or blade, the forward end of said holder being of bifurcated form with two jaws, and the throw-away or expendible cutter tip or blade being clamped against one of the jaws by means of a wedge which is engaged between said tip or blade and the other jaw and which serves, simultaneously with the clamping of the tip or blade, to expand the jaws outwardly against the walls of the slot in the cutter body.

2. A removable cutting unit as claimed in Claim 1, wherein the wedge is operated by a

screw engaging a tapped hole in the body of the holder.

- 5 3. A removable cutting unit as claimed in claim 1 or 2, wherein the cutter tip or blade is supported upon an inclined base surface of the holder.

- 10 4. A removable cutting unit as claimed in any one of claims 1 to 3, wherein the wedge is located in a recess formed in the front of the holder body between the two jaws, and the cutter tip or blade is located against the rear wall of said recess.

- 15 5. A removable cutting unit as claimed in any one of the preceding claims 1 to 4, wherein means are provided whereby the rear or inner end of the holder is adapted to be fixed within the slot in the body of the milling cutter independently of the fixing by expansion of the jaws at the forward end, so

that the position of the holder in its slot need not be disturbed when the front portion of the holder is released from the slot for insertion or removal of the cutter tip or blade.

- 25 6. A removable cutting unit as claimed in claim 5, wherein the rear end of the holder is formed with two laterally-spaced jaws between which a screw-operated wedge engages whereby said jaws may be spread laterally outwards to frictionally engage the sides of the slot in the body.

- 30 7. A removable cutting unit, for a milling cutter of the kind referred to, substantially as herein described with reference to the accompanying drawings.

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FIG. 1

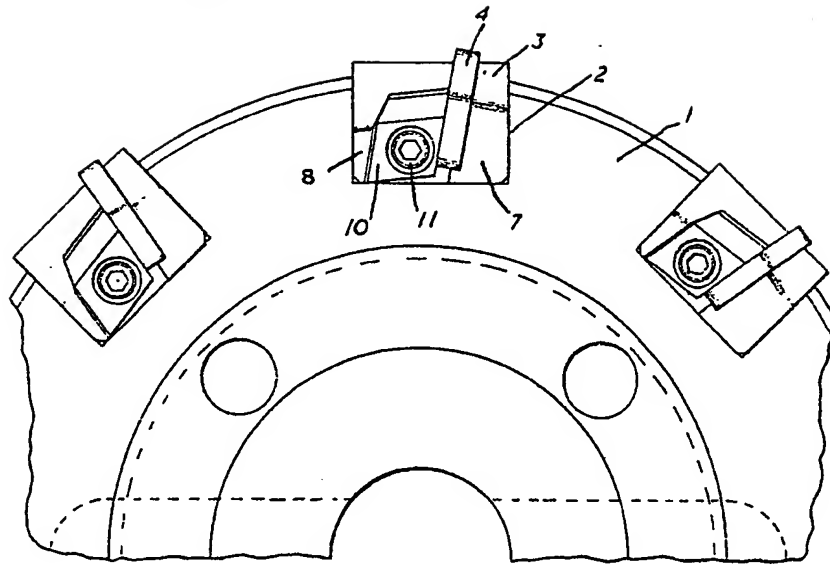


FIG. 2

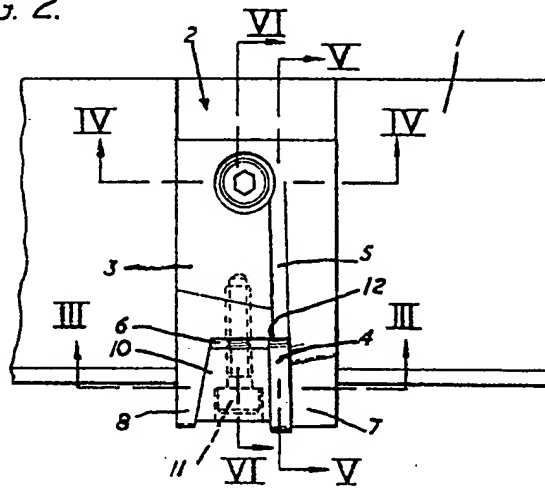


FIG. 3.

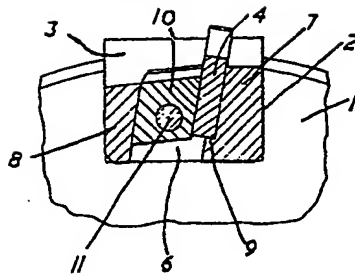


FIG. 4.

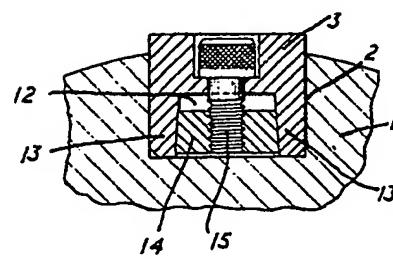


FIG. 5.

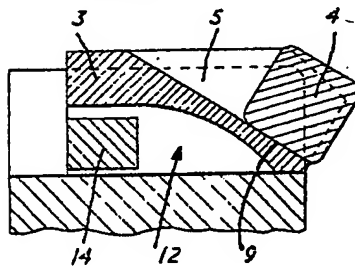


FIG. 6.

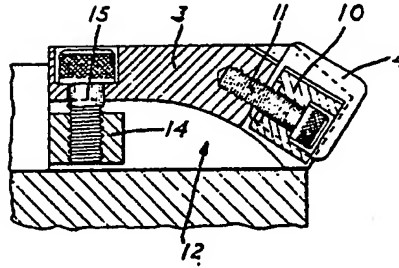
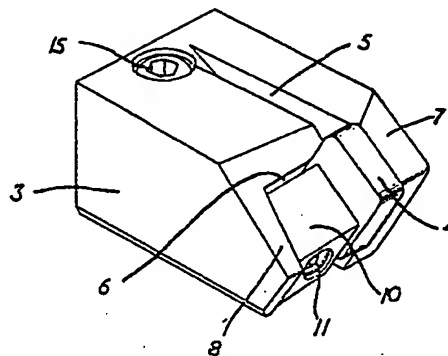


FIG. 7.



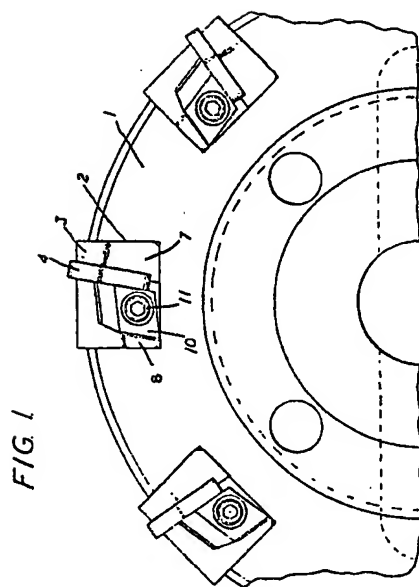


FIG. 1

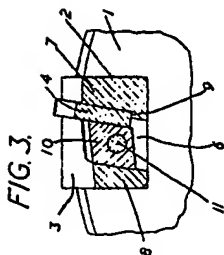


FIG. 3

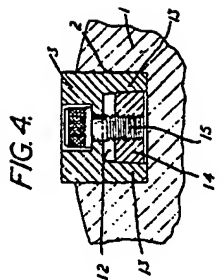


FIG. 4

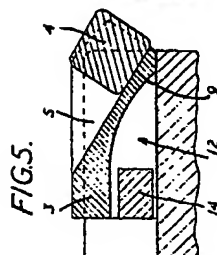


FIG. 5

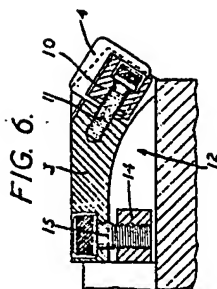


FIG. 6

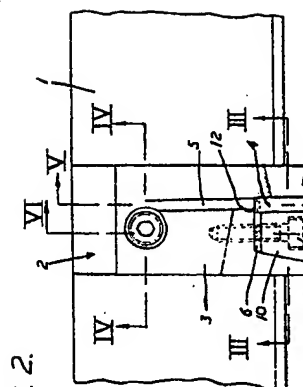


FIG. 2

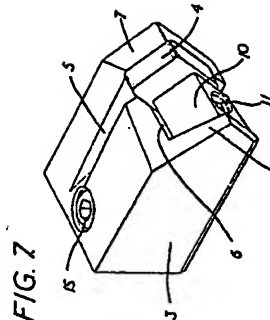


FIG. 7